

THAT WHICH IS CLAIMED IS:

1. A method of manufacturing a vehicle interior trim component including a decoupler layer, comprising:

conveying materials into an enclosure to form a preform having a shape of the enclosure, wherein the enclosure has a perforated portion and at least one panel movable relative to the enclosure so as to selectively expose portions of the perforated portion, wherein the fiber density of the preform may be varied as the at least one panel is moved to expose the perforated portion of the enclosure;

heating the preform to a first temperature such that adjacent materials bond to one another upon cooling;

heating a vehicle interior trim component to a second temperature;

mating the heated preform to the heated vehicle interior trim component; and

forming the mated preform and vehicle interior trim component into a predetermined three-dimensional interior trim product configuration including a decoupler layer via a mold.

2. The method of claim 1, wherein the vehicle interior trim component comprises carpeting.

3. The method of claim 1, wherein the vehicle interior trim component comprises a dash insulator.

4. The method of claim 1, wherein the vehicle interior trim component comprises trunk trim.

5. The method of claim 1, wherein the vehicle interior trim component comprises a headliner.

6. The method of claim 1, wherein the enclosure has a contoured shape.

7. The method of claim 1 wherein the materials comprise thermoplastic material, thermoset material, fibrous material, foam, woven material, nonwoven material, fiber of any type, and combinations thereof.

8. The method of claim 7, wherein the fibers may comprise any of natural fibers, synthetic fibers, recycled fibers, bicomponent fibers and blends thereof.

9. The method of claim 8, wherein the fibers comprise shoddy fibers.

10. The method of claim 1, wherein the materials are conveyed into the enclosure in a substantially loose state.

11. The method of claim 1, wherein a carrier layer is disposed within the enclosure and wherein the preform is supported by the carrier layer.

12. The method of claim 11, wherein the carrier layer comprises an acoustic web of material, shoddy or cover layer for a trim component.

13. The method of claim 11, wherein the carrier layer comprises scrim material.

14. The method of claim 11, wherein the carrier layer comprises an endless belt.

15. The method of claim 1, wherein the

materials are conveyed into the enclosure from more than one direction.

16. The method of claim 1, wherein the materials are conveyed into the enclosure so as to form a preform having first and second portions having different respective fiber densities.

17. The method of claim 16, wherein the fibers are conveyed into the enclosure so as to form a preform having first and second portions having different cross-sectional dimensions, and wherein the forming step comprises forming the heated preform and said interior trim component into a predetermined three-dimensional interior trim product configuration having a decoupler layer.

18. The method of claim 16, wherein the fibers are conveyed into the enclosure so as to form a preform having first and second portions having the same cross-sectional dimensions, and wherein the forming step comprises forming the heated preform and said interior trim component into a predetermined three-dimensional interior trim product configuration having a decoupler layer.

19. The method of claim 1, wherein conveying materials into the enclosure includes the adjusting of the rate of movement of the at least one panel to adjust fiber density in identified portions of the decoupler layer requiring enhanced sound attenuation.

20. The method of claim 1, further comprising the ascertaining of acoustic properties of a vehicle passenger compartment to identify portions of the

decoupler layer requiring enhanced sound attenuation.

21. The method of claim 20, wherein the ascertaining of acoustic properties of the vehicle passenger compartment comprises identifying portions of the decoupler layer at which sound within a predetermined frequency range is directed at an intensity level that exceeds a threshold intensity level.

22. The method of claim 1 wherein the materials are heated as they are conveyed into said enclosure.

23. The method of claim 1 wherein including a plurality of panels movable relative to the enclosure.

24. The method of claim 23 wherein said panels are hingedly moveable and selectively opened and closed.

25. The method of claim 1 wherein said enclosure includes a partition.

26. The method of claim 1 wherein the density of the preform may be varied as the at least one panel is moved to expose the perforated portion of the enclosure.

27. The method of claim 1 wherein the step of heating the preform to a temperature such that adjacent materials may bond to one another upon cooling comprises supplying the preform with materials comprising an amorphous polymer and a crystalline polymer wherein the amorphous polymer is heated above its glass transition temperature (T_g) and the crystalline polymer is heated to a temperature below its melting point (T_m).

28. A system for manufacturing a vehicle interior trim component including a decoupler layer, comprising:

an enclosure comprising a perforated portion and at least one panel movable relative to the enclosure so as to selectively expose portions of the perforated portion;

a feeder configured to convey materials into the enclosure to form a preform having a shape of the enclosure;

an oven configured to heat the preform to a temperature such that adjacent materials bond to one another upon cooling, said oven further configured to heat said interior trim component for bonding to said preform; and

a mold that forms the heated preform and heated interior trim component into a predetermined three-dimensional interior trim product configuration including a decoupler layer;

wherein the density of the preform within the enclosure may be varied by moving the at least one panel to expose the perforated portion of the enclosure as materials are blown into the enclosure.

29. The system of claim 28 wherein the system includes a plurality of panels movable relative to the enclosure.

30. The system of claim 29 wherein said panels are hingedly movable and capable of being selectively opened and closed.

31. The system of claim 28 wherein the materials comprise thermoplastic material, thermoset material, fibrous material, foam, woven material,

nonwoven material, fiber of any type, and combinations thereof.

32. The system of claim 31, further comprising a bale cutter that is configured to provide fibers to said feeder.

33. The system of claim 31, further comprising an opener that is configured to provide fibers to the blower in a substantially loose state.

34. The system of claim 28, wherein said oven includes a first heat source for supplying circulated heated air to heat said preform and a second heat source for heating said interior trim component.

35. The system of claim 34, wherein said second heat source is a radiant heater.

36. The system of claim 35, wherein said radiant heater is an infrared heater.

37. The system of claim 28, wherein said oven includes a perforated tube sheet connected to hollow tubes or needles for supplying air to said preform and said interior trim component.

38. The system of claim 28, wherein said oven includes one or more ducts that direct heated air to said preform and said interior trim component.

39. The system of claim 28 further including a process controller wherein said process controller includes inputting of processing variables and said process controller outputs control parameters to said system to provide a desired geometry and density for said

preform and said decoupler layer.

40. A machine-readable medium whose contents causes a system to perform a method of forming a decoupler layer for a vehicle interior trim component comprising

storing the desired acoustical characteristics of an interior trim component configuration including a decoupler layer, in said medium;

storing processing variables required to provide said desired acoustical characteristics of said decoupler layer;

selecting at least one processing variable required to form said decoupler layer with said desired acoustical characteristics;

outputting said at least one processing variable to said system to perform said method of forming said interior trim component including a decoupler layer.

41. A vehicle interior trim component including a decoupler layer, comprising a molded preform of thermally bonded materials having first and second portions with different respective densities thermally bonded to an interior trim component.

42. The interior trim component of claim 41 wherein said preform having the shape of an enclosure comprises materials conveyed into said enclosure in a substantially loose state.

43. The interior trim component of claim 41, wherein said first and second preform portions have different cross-sectional dimensions.

44. The interior trim component of claim 41, wherein said first and second preform portions have substantially the same cross-sectional dimension.

45. The interior trim component of claim 41 wherein the materials comprise thermoplastic material, thermoset material, fibrous material, foam, woven material, nonwoven material, fiber of any type, and combinations thereof.

46. The interior trim component of claim 45, wherein the fibers may comprise any of natural fibers, synthetic fibers, bicomponent fibers, recycled fiber and blends thereof.

47. The interior trim component of claim 45, wherein the fibers comprise shoddy fibers.

48. The interior trim component of claim 45, wherein different denier fibers may comprise said first and second preform portions.

49. A method of manufacturing a vehicle interior trim component including a decoupler layer, comprising:

conveying materials into an enclosure to form a preform having a shape of the enclosure, wherein the enclosure has a panel containing one or a plurality of movable portions relative to the enclosure so as to selectively expose portions of the enclosure, wherein the density of the preform may be varied as the at least one or plurality of movable portions are moved to expose a portion of the enclosure;

heating the preform to a temperature such that adjacent materials may bond to one another upon cooling;

heating a vehicle interior trim component to a

second temperature;

mating the heated preform to the heated vehicle interior trim component; and

forming the mated preform and vehicle interior trim component into a predetermined three-dimensional interior trim product configuration including a decoupler layer via a mold.

50. The method of claim 49 wherein said step of conveying materials includes introducing said materials in a substantially loose state by blowing said materials into said enclosure with an air stream, and said one or plurality of moveable portions upon moving defines an opening in said panel to expose a portion of the enclosure, wherein said openings further include a structure to regulate the amount of air that blows through and the amount of material retained in the enclosure.

51. The method of claim 50 wherein vacuum is included to convey said materials into said enclosure to form said preform.

52. The method of claim 50 wherein said step of conveying materials includes introducing said materials in a substantially loose state by blowing said materials into said enclosure with an air stream and applying a vacuum to convey said materials.

53. The method of claim 50 wherein the materials comprise thermoplastic material, thermoset material, fibrous material, foam, woven material, nonwoven material, fiber of any type, and combinations thereof.

54. A method of manufacturing an article

having a controlled density, comprising:

conveying materials into an enclosure to form a preform having a shape of the enclosure, wherein the enclosure has a perforated portion and at least one panel movable relative to the enclosure so as to selectively expose portions of the perforated portion; and

heating the preform to a temperature such that adjacent materials may bond to one another upon cooling.

55. The method of claim 54 further comprising heating a vehicle interior trim component to a second temperature;

mating the heated preform to a heated vehicle interior trim component; and

forming the mated preform and vehicle interior trim component into a predetermined three-dimensional interior trim product configuration including a decoupler layer via a mold.